

UNIVERSITI TEKNOLOGI MARA

THIN FILM DEPOSITION OF UN-DOPED AND N-DOPED TITANIUM OXIDE NANOFIBROUS BY USING ELECTROSPINNING METHOD FOR PHOTOVOLTAIC APPLICATIONS

FAREEZ IZWAN BIN NORMAN WONG

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ABSTRACT

Titanium dioxide have a bright future on photovoltaic application with intention to provide alternative energy method. Titanium dioxide have the ability to produce high performance for photovoltaic application. The successful exploitation of titanium dioxide required development of technique to improve the physical and chemical properties. This research study aims on fabrication of fine size nitrogen doped titanium dioxide fiber under objectives to produced fine nitrogen-doped titanium dioxide nanofiber by using electrospinning method, characterized the chemical and physical properties of produced fiber and evaluate the performance of produced N-doped titanium dioxide nanofiber photovoltaic cell under visible light. Hydrolysis of titanium isopropoxide, doping with nitrogen source which was ammonium nitrate and electrospinning technique was used to produce N-doped titanium dioxide nanofiber. Doping the titanium oxide with nitrogen element improved its chemical properties by successfully lowered the band gap energy to 2.76 eV and shift its optical response to the visible light region. The presence of O-H stretching vibration, O-H bending and vibration of the N-Ti bond contributed to increase the performance of the photovoltaic cells. The produced electrospun N-doped was proved to have better power output. Since, the nitrogen doped gives higher absorbance wavelength and lower band gap energy. The improvement on the chemical and physical properties of the produced N-doped titanium oxide had overcome the drawback of titanium oxide and used for better photovoltaic performance.

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CHAPTER ONE

INTRODUCTION TO RESEARCH

1.1 TITLE OF RESEARCH

Thin film deposition of un-doped and N-Doped titanium oxide nanofibrous by using electrospinning method for photovoltaic applications.

1.2 BACKGROUND OF RESEARCH

The essential of nanoparticle cannot be denied nowadays with quickly grow in number of scientific research and publications. Nanoparticles are very fine particles with nanometer scale size. The word “Nano” was arised from the Greek expression which mean ‘dwarf’. Nano is a unit prefix express a factor of ten to the power of minus 9 or 0.000000001. Nanometer (nm) which was used in this topic was referred to the unit length represent fine particles 10nm to 20nm in size. The solid materials physical properties changes drastically in this scale (Hosokawa 2007).

For a past few decades, nanoparticles were studied for their size-dependent chemical and physical properties(Murray, Kagan, and Bawendi 2000). The nanomaterials are at the most advanced level at present in scientific knowledge and even in commercial application. The potential advantages of such a technology are great. The capability of nanotechnologies is that it is possible to create more efficient materials with very useful characteristics like better strength, ductility, lightness, water repellency, very small particle size, thermal and electrical conductivity. Nanoparticles established itself as a key enabling technology for a wide range of applications, it already used in hundreds of products among the industrial sector, mostly, electronic, energy, composites, chemical, cosmetics and healthcare.